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ABSTRACT

"Lasbarhetsindex" ("Lix") is a readability formula developed in Sweden that holds promise for assessing text difficulty in other languages, including English. So far three separate studies have been conducted to test Lix with French and English texts, with German and English texts, and with Greek and English texts. In all three cases high correlations were found between the Lix scores across languages. The steps for computing Lix scores are as follows: (1) count the total number of words, the number of long words (more than six letters), and the number of sentences in the text; (2) compute the percentage of long words in the text; (3) compute the average words per sentence; and (4) add the two values for 2 and 3 and round to the nearest whole number. Scores usually range from 20 ("very easy") to 60 ("very difficult"). Although the research base for Lix is preliminary and certain language variations necessitate establishing norms for Lix scores across languages, the Lix formula appears to be easy to compute (assuring intercoder reliability) and useful for examining texts at a variety of levels, from young children's materials through secondary level and adult texts. (RL)

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Analysing the readability of English and
non-English texts in the classroom
with Lix

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There's an obvious difference in reading difficulty between

Where the amount of the annuity derived by the taxpayer during a year of income is more than, or less than, the amount payable for a whole year, the amount to be excluded from the amount so derived is the amount which bears to the amount which, but for this subsection, would be the amount to be so excluded the same proportion as the amount so derived bears to the amount payable for the whole year.

and

I went to sleep with gum in my mouth and now there's gum in my hair and when I got out of bed this morning I tripped on the skateboard and by mistake I dropped my sweater in the sink while the water was running and I could tell it was going to be a terrible, horrible, no good, very bad day. I think I'll move to Australia.

No reading teacher needs the findings of readability research to detect that the first sentence is a prime example of gobbledygook - a delightful onomatopoeic term coined by Maverick, a U.S. government official, to describe verbose, pompous, often unintelligible, double-talk. He says that the language of Washington reminded him of the old, bearded turkey-gobbler from his home in Texas, "who was always gobbledygobbling and strutting with ridiculous promposity. At the the end of his gobble there was a sort of gook".

It may come as no surprise that the first text is quoted from the Australian Income Tax Act. But what are the characteristics of the second text (from "Alexander and the Terrible, Horrible, No Good, Very Bad Day!" by Judith Viorst) which make it presumeably more comprehensible than the first? This article looks at techniques which the classroom teacher may use, not to dispense with professional judgment, but to supplement it. In particular, a little-known technique is highlighted which may prove especially useful in the multicultural classroom environment with English and with other languages.

An interactionist viewpoint

Reading from the top down, the theme of the Darwin conference, refers of course not only to the Northern Territory's geographical location. The phrase has been used to encompass those theories or models which are to be distinguished from others with a bottom up orientation. A similar distinction has been made between inside-out and outside in theories (Cambourne 1979). Top down, like inside-out accounts of the reading process, emphasise that meaning is brought to texts primarily from inside the head (the top), rather than the other way round.

Before analysing features of text, it is important to consider the place of text, not only within the reading process as suggested by phrases like top down, but within the total writing-reading process. The view favoured here is an interactionist one: both writer and reader interact with text, and writing and reading always occur within a given context, each interacting with the other. Diagrammatically the position may be portrayed as in Figure 1:

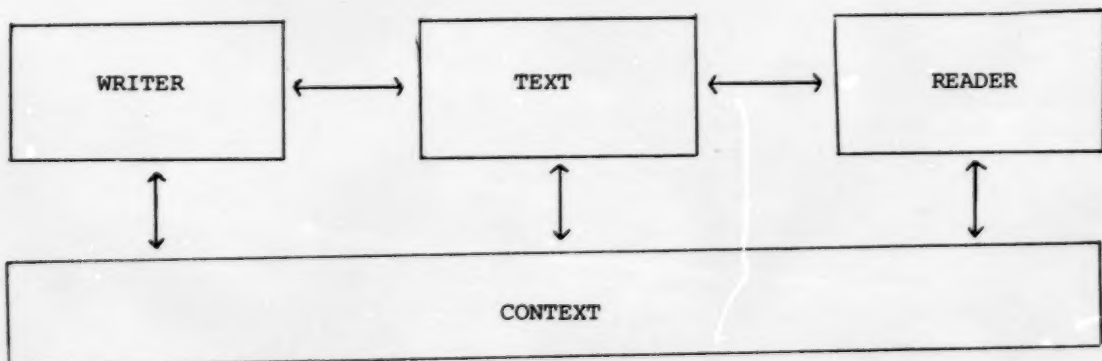


FIGURE 1

Diagrammatic representation of the writing-reading process

It is not the place here to explore the various interactions in Figure 1 further. Although the focus below is on specific aspects of text, there would be no text without a writer and, similarly, reading (of print) requires both reader and text. It is for reasons of convenience and managability only that text features are discussed and analysed as though their effects were independent.

Readability of non-English texts

There have been three major summaries of readability research in the past twenty years. In Klare's (1963) review appeared the comment that "very little readability research and formula development have taken place in other countries" (p.98). This comment apparently applied not only to countries where English was not the mother tongue but to all countries other than the United States. Consequently, Klare continued, "this has made it rather natural for American research workers to apply American formulas to foreign language material" (p.98). The exceptions noted were the work of Tharp with French materials, Spaulding's development of two formulae for Spanish, and Shiba's application of cloze procedure to Japanese.

During the next decade the United Kingdom Reading Association monograph (Gilliland 1972), entitled Readability, was published. Although this latter book described readability research in Britain (notably that of Mugford), Klare's comments about the lack of formula development in other (non-English) languages still applied for Gilliland did not address the problem of readability in languages other than English.

The most recent work on readability, also from the United Kingdom, is Harrison's (1980) Readability in the Classroom. Again, surprisingly, no

reference is made to the problem of gauging the readability of non-English materials.

If education for a multicultural society is one of the key issues for reading teachers in the coming decade (see Anderson 1981), the general lack of awareness of foreign language readability assessment, as evident in the research summaries cited, seems a major shortcoming. And yet there is a readability formula, developed in Sweden, which holds promise for assessing text difficulty in other languages, including English. Below its use with French, German, Greek and English texts is reported.

The Swedish formula

A few years before the appearance of Gilliland's book, Readability, Björnsson (1968) published a book entitled Läsbarhet. By coincidence he selected the same one-word title as did Gilliland, for *läsbarhet* is Swedish for readability. Björnsson's book appears to be little known outside Sweden (no doubt because relatively few people know Swedish); yet it deserves to be brought to the attention of classroom teachers more widely.

Björnsson (1968) details the development of a new readability formula - from the selection of 12 features of text known to contribute to reading difficulty, through to the measurement of each of these across 18 books in each of the 9 levels of the Swedish comprehensive school (i.e., 162 books in all), finally to the use of the traditional regression approach to determine which of the measured text features best estimated teachers' (and, rather interestingly, pupils') judged book difficulty.

Each of the 12 readability factors was tested against such requirements as validity, reliability, objectivity, and ease of computation. After much trialling and culling of factors, Björnsson, like other researchers before him, found that two factors - a word factor and a sentence factor - could

be used to predict readability quite accurately. He called his readability index Läsbarhetsindex which, in accordance with Zipf's law, in time was shortened to Lix.

The word factor in Lix is the familiar word length variable but it is measured differently from most other readability formulae. Rather than a count of syllables, polysyllabic words, or unfamiliar words as judged by a word list, word length for Lix is gauged by the percentage of long words (i.e., words of more than six letters). This method of gauging word length was considered to make Lix more objective and quicker to compute than other formulae. The sentence factor adopted (sentence length) is the average number of words per sentence, as in the Flesch, Spache, Fry and many other measures of readability. Finally, word and sentence factors are weighted equally, and this, too, contributes to ease of calculation. Lix is then defined as follows:

$$\text{Lix} = \text{word length} + \text{sentence length}$$

where word length = percentage of words of more than six
letters;

and sentence length = average number of words per sentence.

Nelson (1977), in commenting upon the computation of Lix notes:

Lix is not only simple to calculate, avoiding as it does, mathematical formulae, it differs from the English readability measures in two important ways. Firstly, it bypasses the problem of whether to count monosyllabic words, polysyllabic words or total syllables by including only words beyond a certain length; that it is a measure which ignores the linguistic rules of syllabification suggests that it is potentially useful across languages. Secondly, Lix calculates the percentage of long words from 100 word samples while sentence length is computed from separate 10 sentence samples.

Trialling Lix with French and English texts

In the first trial of Lix to be reported here, a graduate student at Flinders University, in an unpublished report (Nelson 1977), tested Lix with French and English texts. This was a small independent project undertaken

as part of the Diploma in Education and 10 books of fiction used in upper primary and lower secondary school were selected. The books, however, were selected because of the availability of a translation in the other language. Some of the books were English titles for which there was a French translation while others were French titles for which there was an English translation. Samples of text were selected randomly from each book and then parallel samples were identified in the translation.

As a test of Lix, indices were calculated for each title in both French and English. Björnsson's recommended procedure of selecting a 2000-word sample (made up of 20 100-word samples) and a separate sample of 200 sentences (20 samples each of 10 sentences) was followed. In order to compare these estimates of reading difficulty with some other acceptable measure, Flesch's Reading Ease Formula (Flesch 1948) was also applied over the 2000-word sample from each title, in both languages. Flesch's formula was judged appropriate for the levels of difficulty of the texts, at least as far as English was concerned.

The resulting correlations are of interest. Lix indices in French correlated 0.87 with Lix indices in English; while Flesch indices across languages correlated 0.90. Both correlation coefficients suggested that the factors being measured in French and English by these two formulae were very similar. When Lix and Flesch were correlated over the French books, the correlation was -0.80 while over the English books it was -0.78 (the negative correlations resulting because difficulty is rated high on Lix but low on Flesch). When it is remembered that the Lix sample from each book was not identical to the Flesch sample (because the former included an additional 200 sentences), these correlations are indeed high. If Flesch is considered to provide a valid measure of text difficulty, then Lix would appear to be measuring text difficulty similarly.

Further trials with German and English texts

A second trialling of Lix was undertaken for another project within the Diploma in Education at Flinders University (D'Antuoni 1978), this time with German and English texts. From a population of 204 twentieth century German works of fiction in the University Library, 20 were randomly selected; independent word and sentence samples were drawn from each, and then these German samples were translated into English. This procedure of selecting text samples for analysis was adopted in order to reduce the variability between languages, by matching pairs of samples as closely as possible. When translating, each German sentence "was read and then the idea involved was expressed as accurately as possible in English" (p.9).

As in the project by Nelson, German Lix scores were correlated with English Lix scores. (The Felsch formula was not applied). The correlation for the sample of 20 novels across languages was 0.89. This high degree of correlation is evidence that Lix is consistent across German and English. The result is very similar to that obtained by Nelson (1977) where the correlation of Lix across French and English was 0.87.

Although the correlations reported in the Nelson (1977) and D'Antuoni (1978) studies across languages are high, it does not follow that the magnitude of the Lix scores in the three languages is similar. As might have been expected, the mean Lix score for German was higher than that for English. This is because of the pattern in German for words and morphemes to coalesce to form longer words, thus increasing the percentage of long words. At the same time, sentence length is consequently decreased. The net result, due to the much greater difference in the percentage of long words between German and English, was "consistently higher scores for German" (D'Antuoni 1978, p.11). Similarly, Nelson (1977) reported higher Lix scores for French fiction compared with the English translations. These

findings suggest that, if Lix is to be readily interpreted in languages besides Swedish, then norms need to be established for other languages separately.

Analysing Greek and English texts

In a third project, undertaken as part of the Diploma in Education at Flinders University (Alexandrou 1980), Lix was trialled with a set of children's readers (City Kids). These are printed in Greek, Turkish, Italian, and English, with a no-text edition to cater for other ethnic languages. Alexandrou examined all 24 Greek booklets and the 24 English parallel texts and then Lix and the Edwards readability formula (Edwards 1977) were applied. This latter formula is an Australian adaptation of the Spache (1953) formula, designed for reading material in the early grades (1 to 3). It is based on a list of so-called easy words, the major modifications for Australian schools being the change of American to Australian usage (eg., candy to lolly); the inclusion of common words from current Australian reading series; and the omission of certain less common words (eg., Indian). Before the Edwards modified word list could be used with Greek texts, it needed to be translated into Greek, and this was a useful by-product of the project.

As in the prior trialling with German and French texts, Lix scores in Greek were correlated with Lix scores in English over all books. Due to the size of the books, the total text in each was analysed. The resulting correlation was 0.81. The correlation for the Edwards formula across languages was 0.77. These correlations are only marginally lower than those obtained between German and English and between French and English texts, which may well be explained by the very much smaller samples available in Alexandrou's study.

Interpreting Lix

To illustrate how Lix may be applied in the classroom and how Lix scores may be interpreted, we return to the two texts quoted at the beginning of this article: the Tax Act and the Very Bad Day. The necessary calculations are as follows:

1. Count for each text
 - (a) the total number of words,
 - (b) the number of long words (i.e., words of more than 6 letters), and
 - (c) the number of sentences.
2. Compute word length (percentage of long words): divide (b) by (a) and multiply by 100.
3. Compute sentence length (average length of sentences in words): divide (a) by (c).
4. Add the two values obtained in (2) and (3) and round to the nearest whole number.

These calculations are shown in Table 1.

TABLE 1

Computation of Lix for two texts

Texts	Total no. words	No. long words	No. of sentences	% long words	Av. sentence length	Lix
Tax Act	76	11	1	14.5	76.0	91
Very Bad Day	68	11	2	16.2	34.0	50

The calculations above illustrate how easy Lix is to compute. The counts are quite objective and thus inter-coder reliability is ensured. In addition to ease of calculation, there are certain attractive features as far as interpretation of Lix scores are concerned, which generally do not hold for other readability formulae. First, the equal weighting of word and sentence factors means that the relative contribution of each of these factors is more readily apparent. In the two sample texts, for instance, sentence length clearly contributes more than word length to total Lix score (84 per cent of Lix for the Income Tax text and 68 per cent of Lix for the Very Bad Day text). Second, the word and sentence factors are themselves readily interpretable. Thus, the word length of 14.5 (Income Tax) means that about one in seven words is a long word; and the word length of 16.2 (Very Bad Day) means that every sixth word on average is a long word. (It may surprise that this latter text contains the higher percentage of long words). Just as the word length components of Lix have meaning, so do the sentence length components. In the Income Tax text the sentence length factor indicates that the average sentence length is 76 words while in the second text it averages 34 words.

There are other text factors besides those incorporated in Lix that can make for reading difficulty. As well, factors within the reader and purposes for which the texts are written interact with text features to cause a particular text to be either easy or difficult reading. Lix, like other readability measures, provides only an inexact and incomplete estimate of difficulty. It yields certain information about texts which, like any other information (e.g., content, form and layout), needs to be evaluated in text selection.

Björnsson (1968) provided the following table for interpreting Lix scores (Table 2). However, it is important to note that these norms are

for Swedish and that, as yet, there are no similar norms for interpreting Lix scores in other languages except, as above, by comparing one text with another.

TABLE 2

Interpreting lix scores (Swedish texts)

Text difficulty	Lix
Very easy	20
	25
Easy	30
	35
Medium	40
	45
Difficult	50
	55
Very difficult	60

It is important to note also that the two texts illustrated above are very short (one and two sentences respectively) and no generalisations ought to be made with samples of this size. The three studies reported using French, German, Greek and English texts are also small-scale research studies. Nevertheless, there is a consistency about the findings that suggests Lix may be useful across languages and that Lix may be used at a variety of levels from young children's materials through to secondary-level and adult texts.

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